REMARKS

I. Summary of Office Action

The above amendments and these remarks are in reply to the Office Action dated August 14, 2002. All of the pending claims 1-17 have been rejected. Claim 2 has been rejected under 35 U.S.C. §112, second paragraph, as being indefinite. The drawings have been objected under 37 CFR §1.83(a) for failure to show every feature of the claimed invention.

Claims 1, 3 and 8 are rejected under 35 U.S.C. §102(b) as being anticipated by Pohl (U.S. 4,851,671). Claims 1, 3, 5 and 8 are rejected under 35 U.S.C. 102(a) as being anticipated by the publication of Seo et al. ("Fast Scanning Shear-force microscopy using a high frequency dithering probe," published December 25, 2000.)

Claim 2, as understood, is rejected under 35 U.S.C. §103(a) as being unpatentable over Pohl in view of Watanabe et al. (U.S. Patent 3,872,411). Claim 4 has been rejected under §103(a) as being unpatentable over Pohl in view of Quate (U.S. Patent 5,354,985). Claim 7 has been rejected under §103(a) as being unpatentable over Pohl in view of Quake (U.S. Patent 6,002,471). Claims 5 and 9 have been rejected under §103(a) as being unpatentable over Pohl in view of Karrai (U.S. Patent 5,641,896). Claims 6, 10 and 12 have been rejected under §103(a) as being unpatentable over Pohl in view of Nihioka et al. (U.S. Patent 4,880,975). Claims 11, 13-15 and 17 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Pohl in view of Nishioka et al. as applied to claims 1 and 10, and further in view of Karrai. Claim 16 has been rejected under §103(a) as being unpatentable over Pohl in view of Nishioka et al. and Karrai as applied to claims 1, 10 and 14, and further in view of Ohtaki et al. (U.S. Patent 5,276,324).

II. Objection to The Drawings

The drawings have been objected under 37 CFR §1.83(a) for failure to show every feature of the claimed invention. Specifically, the Examiner points out that the attachment of the electrode with respect to the probe on the resonator is not shown in Figures 2A-2G and 3A-3B.

A proposed drawing correction - in the form of a highlighted (red ink) sketch of changes to be made – is attached hereto. The original Figure 2A shows a plan view of a quartz resonator 20 having an electrode 21 attached thereto. In Figures 2C through 2G, 3A, 3B and 4, the quartz resonator having an electrode is shown in a cross-sectional view. Because the electrode is

attached to a surface of the quartz resonator and because the electrode is a conductive film which is thinner than the resonator or probe, it is difficult to show both the electrode and the probe in the cross-sectional view of the resonator.

In accordance with the present invention, an electrode can be attached anywhere on the surface of the resonator, according to the shape of the resonator to be used. Likewise, in accordance with the present invention, a probe can be attached anywhere on the surface of the resonator according to the shape of the resonator to be used.

The proposed drawing correction, attached hereto, is amended to include a probe (22) attached to an end of a resonator and an electrode (21) attached to a surface of a resonator. Support for this proposed amendment is found in Figure 2E of the present application as originally filed. No new matter has been added. Applicants therefore request that the Examiner enter the proposed drawing correction, and withdraw the objection to the drawings.

III. Rejections Under 35 U.S.C. §112

Claim 2 has been rejected under 35 U.S.C. §112, second paragraph, as being indefinite. The Examiner pointed out that it was unclear how a thickness could be measured in mm^2 because the units of mm^2 suggest an area. However, the Examiner assumed that in claim 2 the Applicants meant to refer to the *area* of the disk shape. The Examiner's assumption was correct. Accordingly, the Applicants have amended claim 2 to recite "a plane *area* of scores of mm^2" instead of "a *thickness* of scores of mm^2." Applicants thank the Examiner for careful review of the claims.

IV. Rejections Under 35 U.S.C. §102

A. Seo et al. Does Not qualify as Prior Art because it is not "By Others."

Claims 1, 3, 5 and 8 are rejected under 35 U.S.C. 102(a) as being anticipated by a publication entitled *Fast-Scanning Shear-Force Microscopy Using A High Frequency Dithering Probe*, Applied Physics Letters Vol. 77, No. 26 (25 December 2000), by Yongho Seo, June H. Park, Jin B. Moon and Wonho Jhe (hereinafter "Seo et al."). Won Ho Jhe and Yong Ho Seo are the named inventors on the present application.

Under 35 U.S.C. 102(a), "[a] person shall be entitled to a patent unless: (a) the invention was known or used ***by others*** in this country, or patented or described in a printed publication in

this or a foreign country, before the invention thereof by the applicant for patent ...." 35 U.S.C. 102(a) Section 2132.01 of the Manual of Patent Examining Procedure (M.P.E.P.) states:

> [W]here the applicant is one of the co-authors of a publication cited against his or her own application, the publication may be removed as a reference by the filing of affidavits made out by the other authors establishing that the relevant portions of the publication originated with, or were obtained from Applicant. Such affidavits are called disclaiming affidavits.

(M.P.E.P. § 2132.01 citing Ex parte Hirschler, 110 USPQ 384 (Bd. App. 1952.))

June H. Park and Jin B. Moon have executed a Disclaiming Declaration, which is attached hereto. In the Disclaiming Declaration, June H. Park and Jin B. Moon declare that they "learned or received knowledge about the invention from the above-identified inventors, Won Ho Jhe and Yong Ho Seo" and that neither Park nor Moon is a co-inventor of the subject matter claimed in the present invention. Accordingly, Applicants therefore request that the rejection over Seo et al. be withdrawn because Seo et al. does not qualify as prior art as it is not "by others."

B. **Amended Claims 1, 3 and 8 are Patentable Over Pohl**

Claims 1, 3 and 8 have been rejected under 35 U.S.C. §102(e) as being anticipated by Pohl (U.S. 4,851,671). The Examiner asserts that Pohl discloses a high frequency dithering probe for a high speed scanning probe microscope, comprising: a crystal resonator having a fundamental resonant frequency in the range of 1MHz – 100MHz (*see* column 2, lines 58-59) and a thickness of 0.01mm – 2.0mm (*see* column 2, line 32); an electrode attached to the resonator; and a probe attached to the resonator.

The present invention teaches a high frequency dithering probe for high speed SPM. For a probe dithering in high speed, the inventors have found that a crystal resonator must have a high fundamental resonant frequency in the range of 1MHz - 100MHz and a thickness thereof that is very small. Further, to increase the dithering sensitivity of the resonator, the Applicants have found that a probe to be attached to the resonator should have a minimal weight. One way to reduce the weight of the probe is to reduce the length of the probe. Accordingly, claim 1 has been amended to recite a "***probe .... having a length of not more than 2mm***." Support for this amendment is found on page 10 of the present application. No new matter has been added.

Neither Pohl nor the other cited references teaches high speed scanning or SPM and does not disclose a "probe .... having a length of not more than 2mm." Because none of the cited references teach "probe .... having a length of not more than 2mm," as recited in the amended claim 1 of the present application, Applicants submit that amended claim 1 is patentable over the cited references. Claims 2 through 18 depend from claim 1, and as such include all of the limitations of claim 1 rendering them patentable also.

V. **Rejections Under 35 U.S.C. §103(a)**

A. **Claim 4 is Patentable Over Pohl in view of Quate**

Claim 4 has been rejected under 35 U.S.C. §103(a) as being unpatentable over Pohl in view of Quate. The Examiner acknowledges that Pohl does not teach a cantilever probe, but asserts that this element is taught by Quate. (Office Action at 4-5.) While Quate teaches use of a cantilever probe, it only teaches attaching the cantilever probe to a piezoelectric unit. Quate does not teach a cantilever probe *attached to a quartz crystal resonator*. Neither Quate nor Pohl suggests attaching a cantilever probe to a quartz crystal resonator. Therefore, it would not have been obvious to a person of ordinary skill in the art at the time the invention was made to attach a cantilever probe to a quartz crystal resonator. Therefore, Claim 4 is patentable over Pohl in view of Quate.

B. **Claim 2 is Patentable Over Pohl in view of Watanabe et al**

Claim 2, as understood by the Examiner, has been rejected under 35 U.S.C. §103(a) as being unpatentable over Pohl in view of Watanabe et al. The Examiner acknowledges that Pohl does not specifically disclose the resonator having a disk type shape or having the claimed area. (Office Action at 4-5.) The Examiner points out that Watanabe et al. teaches a quartz crystal resonator formed in a flat disk type shape. However, Watanabe et al. does not teach a probe attached to a flat disk type quartz crystal resonator. Therefore, it would not have been obvious to a person of ordinary skill in the art at the time the invention was made to attach a probe to a disk type quartz crystal resonator. Therefore, Claim 4 is patentable over Pohl in view of Watanabe et al.

C. **Claims 10 through 17 are Patentable Over Pohl in view of Nishioka et al.**

Claims 6, 10 and 12 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Pohl in view of Nihioka et al. The Examiner acknowledges that Pohl does not specifically

disclose a probe attached to a resonator in such a manner that the probe extends through a hole formed in the resonator. The Office Action states that Nishioka et al. teaches a probe attached in such a manner that it extends through a hole (at 4a) formed in a resonator.

However, Nishioka et al. does not teach the element of claim 10, which recites that, the "probe...extends through a hole formed in the high frequency quartz-crystal resonator." To the contrary, Nishioka et al. teaches a probe extending through a retaining member disposed on the central axis of a cylinder formed by a piezoelectric element. (Nishioka et al. at col. 3, lines 9-24; Fig. 1) This teaching of a probe extending *through a retaining member* attached to a resonator suggests nothing about the possibility of attaching a probe to a resonator by extending the probe through a hole formed in the resonator itself.

Because none of the cited references teach a "probe ... [that] ... extends through a hole formed in the high frequency quartz-crystal resonator," as recited in claim 10 of the present application, Applicants submit that claim 10 is patentable over the cited references. Claims 11 through 17 depend from patentable claim 10, and as such include all of the limitations of claim 10 rendering them patentable also.

D. **Claim 15 is Patentable Over Pohl in view of Nishioka et al.**

Regarding claim 15, the Examiner asserts that Pohl discloses that the probe is directly attached to a surface of the resonator. The Examiner acknowledges that Pohl and Nishioka et al. do not specifically disclose removing a portion of the electrode to attach the probe. (Office Action at 9.) However, the Examiner asserts that:

> it would have been obvious to a person of ordinary skill in the art at the time the invention was made to remove a portion of the electrode in the apparatus of Pohl in view of Nishioka et al. and Karrai *to more easily attach the probe directly to the surface of the resonator.*

(Office Action at 9.) The present office action provides absolutely no support for the above-cited statement. It is not apparent whether the Examiner is taking judicial notice of a fact, or simply stating his own opinion. According, Applicants submit that claim 15 is patentable over Pohl in view of Nishioka et al.

E. **Claim 16 is Patentable Over Pohl in view of Nishioka, Karrai and Ohtaki**

Claim 16 has been rejected under 35 U.S.C. §103(a) as being unpatentable over Pohl in view of Nishioka et al. and Karrai as applied to claims 1, 10 and 14, and further in view of

Ohtaki et al. The Examiner acknowledges that Pohl, Nishioka et al. and Karrai do not specifically disclose a transparent electrode. However, the Examiner points to Ohtaki et al. as teaching transparent electrodes to reduce light loss in scanning tunneling microscopy. However, the transparent electrodes taught by Ohtaki et al. are not attached to any resonator. (Ohtaki et al. at col. 3, lines 5-48.) To the contrary, the electrodes taught by Ohtaki et al. are attached to a circular parallel plain glass 25. (Id.) Ohtaki et al. teaches nothing about a transparent electrode attached to a quartz crystal resonator. Therefore, claim 16 is patentable Over Pohl in view of Nishioka, Karrai and Ohtaki

Attached hereto is a marked-up version of the changes made to the claims by the current amendment. The attached pages are captioned "**VERSION WITH MARKINGS TO SHOW CHANGES MADE.**"

Having shown how Applicants claims define over the cited references, it is submitted that the application as amended is now in condition for allowance and a notice thereof is solicited. In the event that a telephone conference would expedite prosecution of the application, the Examiner is respectfully invited to contact the undersigned by telephone at the number set out below.

Respectfully submitted,

Dated: January 7, 2003

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CERTIFICATE OF MAILING (37 CFR 1.8(a))

I hereby certify that this paper (along with any referred to as being attached or enclosed) is being deposited on January 7, 2003, with the U.S. Postal Service as First class mail in an envelope addressed to: Box Fee Amendment, Assistant Commissioner for Patents, Washington, D.C., 20231.

Date: January 7, 2003

Yolette Yturralde-Owen

VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the Claims

Please amend the following claims:

1. (Once amended) A high frequency dithering probe for a high speed scanning probe microscope, comprising:

a high frequency quartz-crystal resonator having a fundamental resonant frequency in the range of 1MHz ~ 100MHz and a thickness of 0.01mm~2.0mm[;] and having an electrode attached to a surface of the quartz-crystal resonator; and

a probe attached to the quartz-crystal resonator and having a length of not more than 2mm.

2. (Once amended) The high frequency dithering probe of claim 1, wherein the quartz-crystal resonator is formed in a flat disk type shape with a plane area [a thickness] of scores of mm^2.